

REMARKS

The Office Action mailed November 29, 2002 has been given careful consideration by the Applicants. Reconsideration of the application is hereby respectfully requested in view of the above-amendments and the following comments. Claims 1-13 remain pending in the application.

With regard to the Declaration, a new Declaration is currently being executed and will be submitted shortly in a separate response.

With regard to the §112, second paragraph, rejection claims 1, 2, 5, 6, 10, 11, and 13 have been amended to more clearly recite that which the applicants regard as the invention.

With regard to claim 12, the Examiner indicated that it is unclear what compounds are encompassed by the expression "PCB substitutes." Applicants submit that the term "PCB substitutes" is a term having clear definition for the skilled artisan. PCB (polychlorinated biphenylenes) are organic chlorinated chemical products. PCB's are used predominately for there thermal stability and their electrical properties. These characteristics allow them to be used as heat carrier fluids or heat transfer in various industrial applications or in electrical transformer condensers as dielectric fluids. Because of environmental concerns, the PCB production has now been widely stopped. PCB substitutes are biodegradable products having technical characteristics similar to those PCB's. The skilled artisan is familiar with a wide range of products typically used as PCB substitutes. Thus, applicants submit that such expression has a definite meaning for the skilled artisan.

Claims 1 and 7-13 are Not Obvious over Fletcher in View of Sequeira Jr. And EP 0109366

The Examiner rejected claims 1 and 7-13 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,360,420 to Fletcher et al ("Fletcher") in view of U.S. Patent No. 4,328,092 to Sequeira Jr. ("Sequeira") and EP0109366. Applicants respectfully traverse.

- Fletcher discloses a process for refining used oil containing lubricating oil. The process has several steps. First, a volatile forecut is removed from the used oil. The resulting oil is then distilled under reduced pressure to form heavy and light fractions with a portion of said light fraction recycled and mixed into the resulting oil prior to the resulting oil entering the evaporator unit. A heavy lube oil fraction is then obtained from the heavy fraction using evaporation at reduced pressure. The fractions are then mixed with tetrahydrofurfuryl alcohol to remove impurities.

Fletcher is thus clearly directed toward the recycling of a portion of the distillate into a resulting oil in a way to effectively lower the temperature of the evaporation step. This is clearly indicated in the specification which states:

Thus, in one aspect, the present invention relates to the increased yield of recovered lubricating oil without subjecting the waste oil feedstock to temperatures that create conditions that can cause coking, cracking or fouling. In another aspect, this invention relates to a process for varying the recycle of light ends to achieve the desired viscosity of lubricating oil. Still another aspect of this invention relates to reducing the temperature while achieving the desired recovery of lubricating oil from the waste oil feedstock.

Thus, Fletcher only discloses heating the residue in the second stage to 250°F to 500°F (121°C-260°C). It actually teaches away from the higher temperatures claimed in the present application (170-385°C) to avoid coking, cracking and fouling.

In addition, Fletcher does not mention the aspect of providing a process in which the removing of noxious substances in particular PCB's is improved. In particular, Fletcher does not disclose the extraction of fractions with N-Methyl-2-pyrrolidone ("NMP") and/or N-formylmorpholine ("NMF").

Sequeira relates to a method of solvent refining a petroleum based lubricating oil stock containing aromatic and nonaromatic components with NMP. According to Sequeira the benefits of extraction with NMP is "the removal of

- aromatics and other undesirable constituents from lubricating oil based stocks
- improves the viscosity index, color, oxidated stability, thermal stability, and inhibition response of the base oils and the ultimate lubricating oil products.” The removal of environmental noxious substances, in particular PCB's, is not mentioned or suggested in Sequeira as an aspect of the teaching. Further, Sequeira does not disclose an extraction step in direct combination with previous distillation steps of waste oils. In fact, Sequeira is not related to a reprocessing of waste oil at all, but rather to a refining process of petroleum fractions.

Thus, one seeking to remove PCB's during the reprocessing of waste oil would have no motivation to combine Fletcher and Sequeira because they relate to nonanalogous subject matter. Fletcher, as detailed above, relates to the reprocessing of used lubricating oils using temperatures and conditions that prevent coking, cracking, or fouling. Sequeira, on the other hand, does not relate to the reprocessing of waste oils but simply to the extraction of aromatic and nonaromatic components with NMP. Neither relates to the removal of environmentally noxious substances including PCB's in a waste oil. Thus, there is no motivation to combine the two references. Consequently, it would not have been obvious for the skilled artisan to combine the teachings of Fletcher with the teachings of Sequeira. Moreover, each of Fletcher and Sequeira are directed to different reprocessing techniques. The only basis or suggestion to combine the techniques arises from the teaching of the present invention. This type of hindsight obviousness does not preclude patentability.

EP 0109366 is concerned with a method for decontaminating mineral oils in dielectric silicon fluids using pyrrolidone derivatives to remove PCB contaminants. EP 0109366 is not directed to the reprocessing of waste oils. In fact, it is not even related to the decontamination of waste oils at all. Thus, a skilled artisan seeking to remove PCB's during the reprocessing of waste oil would not be motivated to combine EP 0109366 with either Fletcher or Sequeira. EP 0109366 deals only with the decontamination of dielectric fluids contaminated by PCB's prior to their use in fully decontaminated equipment.

- For at least these reasons, the combination of Fletcher, Sequeira and EP 0109366 fails to render the present claims obvious under §103(a).

Claims 2-6 are Not Obvious Over Fletcher in View of Sequeira and EP 0109366 and Further in View of U.S. Patent No. 4,021,333.

The Examiner rejected claims 2-6 under 35 U.S.C. §103(a) as being unpatentable over Fletcher in view of Sequeira and EP 0109366 and further in view of U.S. Patent No. 4,021,333 to Habiby et al ("Habiby").

First, a combination of Fletcher, Sequeira and EP 0109366 is improper as detailed above. Thus, a combination of the three references with Habiby is also improper.

Second, despite the Examiner's assertion, Habiby discloses treating the waste oil with an alkaline solution prior to the distillation, rather than during the distillation. This is clearly shown in the paragraph beginning in column 4, line 3 which states that:

The advantage of alkaline treatment is that metallic constituents of the used oil are concentrated in a solid sludge which is readily removed in the subsequent dilution step, resulting in a relatively clean material to be subjected to distillation. (emphasis added)

This clearly indicates that the alkaline treatment is prior to the dilution step which itself is prior to the distillation step. Thus, a combination of Habiby with the prior noted references fails to render claims 2-6 obvious.

CONCLUSION

In view of the forgoing, the Applicants submit that claims 1-13 are in condition for allowance. Applicants respectfully request early notification of such allowance. Should any issues remain unresolved, the Examiner is encouraged to contact the undersigned to attempt to resolve any such issues.

- If any fee is due in conjunction with the filing of this Amendment and
- response, Applicants authorize deduction of that fee from Deposit Account 06-0308.

Respectfully submitted,

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DATED

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Attachment: Version with Markings to Show Changes Made.

IN THE CLAIMS:

1. (Amended) Method for reprocessing waste oils and production of high-grade base oils, comprising the following steps:

A) distillation of the waste oil for removal of low boiling organic fractions and removal of water;

B) distillation under vacuum of the waste oil obtained according to step A) for segregation of fuel oil and diesel fractions with boiling cut of about 170 to 385°C in form of high grade fuel oils;

C) non-destructive distillation of the distillation residue from step B) by means of thin film evaporation in [high] vacuum to obtain a lubricating oil fraction [with a standard viscosity range], which can be separated, as needed, via a subsequent distillative fractioning step, optionally under vacuum, into boiling cuts of different viscosity states;

D) if appropriate, non-destructive distillation of the bottom product from step C) in order to obtain a lubricating oil fraction of higher viscosity state than the fraction obtained in step C) [from the higher boiling range] which can be segregated, as needed, optionally under vacuum, by means of a subsequent distillative fractioning step;

E) extraction of the fraction or fractions in the form of lubricating oil fractions or boiling cuts of different viscosity states from step C) and optionally D) with N-methyl-2-pyrrolidone (NMP) and/or N-formylmorpholine (NMF) as extraction medium in order to obtain very high grade base oils whereby the extraction is executed in such manner that undesirable constituents are removed in an almost quantitative manner, and the contents of the polycyclic aromatic hydrocarbons (PAK) and polychlorinated biphenylenes (PCB) lies, respectively, below 1 mg/kg.

2. (Amended) Method according to Claim 1, wherein the waste oils to be reprocessed are treated with ~~[concentrated]~~ watery alkaline solution as reagent in order to segregate interfering constituents.

5. (Amended) Method according to Claim 4, wherein the alkaline solution is approximately 5 to 50% by weight potassium hydroxide solution.

6. (Amended) Method according to Claim 5, wherein the feed (charge for extraction) is imparted an alkalinity reserve, ~~[which prevents the otherwise usual, partially even irreversible, acidulation of the reclaimed]~~ to prevent formation of acid reaction products in the extraction medium.

10. (Amended) Method according to Claim 9, wherein an extract phase is cooled down and ~~[that the]~~ a settling oil phase is again added to the feed.

11. (Amended) Method according to claim 1 wherein the extraction is performed with a temperature gradient, whereby the temperature is adjusted at ~~[the]~~ an extraction column head (run off raffinate) to approximately 50 to 90°C and at ~~[the]~~ an extraction column end (extract run-off) to approximately 10 to 50°C.

13. (Amended) Method according to claim 1 wherein the waste oil to be reprocessed has a contents of vegetable ~~[oil(s)]~~ oils of up to approximately 5%.